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09/821,220	03/29/2001	Atsushi Kikuchi	09792909-4863	5401

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EXAMINER	
DO, CHAT C	

ART UNIT	PAPER NUMBER
2124	

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/821,220	KIKUCHI ET AL.	
	Examiner	Art Unit	
	Chat C. Do	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/10/2004; 7/2/2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *9-16 and 25-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 17-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/2/04; 5/10/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is responsive to Amendment filed 05/10/2004.

2. Claims 1-32 are pending in this application. Claims 9-16 and 25-32 are withdrawn without traverse. In Amendment, claims 1, 5, 17, and 21 are amended. This office action is made final.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-8 and 17-24 are rejected under 35 U.S.C. 103(a) as being obvious over Tsutsui (U.S. 5,349,549) in view of Suter et al. (U.S. 5,831,883).

Re claim 1, Tsutsui discloses in Figure 2 a signal processing device adapted to multiply the $N/(2^m)$ (wherein $m = 0$ as seen in S02), samples obtained by decimating the N samples of a signal (process from S01 to S02), by a forward transform window and subsequently perform a linear forward transform on the obtained signal (col. 6 lines 43-49) device comprising: a preprocessing means (col. 5 lines 9-12) for performing a predetermined preprocessing operation on the signal obtained by the multiplication using the multiplier of forward transform window; a transform processing means (col. 5 lines 13-16) for performing a processing operation equivalent to a fast Fourier transform on the

output signal of preprocessing means; a postprocessing means (col. 5 lines 17-20) for performing a predetermined postprocessing operation on the output signal of transform processing means; and the input signal and the output signal of transform processing means being complex signals having a length of N/(2^(m+2)) (col. 5 lines 13-16 as N/4 complex numbers). Tsutsui fails to disclose a case wherein m is an integer larger than 1. However, Suter et al. disclose in Figure 1 that the data are down sampling prior entering FFT stages (col. 3 lines 28-40). In addition, "m" integer is just a factor to control the rate of down sampling prior entering the FFT stages as m is larger, the sampling rate would be longer and lesser sampling values. Tsutsui discloses the input sample is N however N would be any number represent samples. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to have $N/(2^m)$ samples wherein m is larger than 1 as seen in Suter et al.'s reference into Tsutsui's invention because it would enable to performing faster Fourier transforming employing mathematically justified manipulation of input data rate and lower power consumption by processor (abstract).

Re claim 2, Tsutsui further discloses in Figure 1 transform window for the length corresponding to the N samples before decimation has a length corresponding to N/(2^m) samples and is obtained by halving the sum of the $(2^{mn} + 2^{m-1} - 1)$-th sample and the $(2^{mn} + 2^{m-1})$-th sample (overlapping samples by 50% as seen in (J-1)-th block and J-th block).

Re claim 3, Tsutsui further discloses preprocessing means produce the following signal from $N/(2^m)$ samples multiplied by forward window; first intermediate signal of $N/(2^m)$ samples, of which n-th sample is obtained by inverting the polarity (col. 21 lines

49-54) of the n+3N/(2^(m+2))-th forward windowed sample for n between 0 and N/(2^(m+2))-1, and setting N/(2^(m+2))-th forward windowed sample for n between N/(2^(m+2)) and N/(2^(in))-1 (n being an integer from 0 to N-1) (col. 21 lines 35-47); second intermediate signal of $N/(2^m)$ samples, of which n-th sample is obtained by subtracting N/(2^(m)-1-2n-th from 2n-th sample of first intermediate signal (col. 21 lines 58-68); and complex signal for output equivalent the signal of which n-th sample is a product of exp(-2^(m+1)pi*jn/N) and a complex signal of which real part is 2n-th sample of second intermediate signal and imaginary part is 2n+1-th sample of second intermediate signal (col. 22 lines 1-18).

Re claim 4, Tsutsui further discloses postprocessing means produce the following signal from the N/(2^(m+2)) sample output complex signal of transform processing means; third intermediate signal, of which k-th sample is obtained by halving the sum of the k-th and the conjugate of N/(2^(m+2))-1-k-th sample of output complex signal of transform processing means (k being an integer from 0 to N/2-1) (col. 22 line 24 and lines 36-38); fourth intermediate signal of which k-th sample is obtained by dividing 21 and multiplying exp(-2^(m+1)pi*j(2k-i-l)/N) by the value subtracted conjugate of N/(2^(m+2))-1-k-th from k-th sample of output complex signal of transform processing means (col. 22 lines 39-44 and lines 47-50); fifth intermediate signal of which k-th sample is obtained by halving the sum of the N/(2^(m+2))-l-k-th and the conjugate k-th sample of output complex signal of transform processing means (col. 22 lines 52-55); sixth intermediate signal, of which k-th sample is obtained by dividing 21 and multiplying exp(2^(m+l)pi*j(2k+l)/N) by the value subtracted conjugate of k-th from

N/(2^(m+2))-1-k-th sample f output complex signal of transform processing means (col. 22 lines 45-47); and complex signal for output, equivalent to the signal of which front half is obtained as the real part of the product of exp(-(2^m)pi*j(2k+1)/(2N)) and the sum of k-th sample of third intermediate signal and k-th sample of fourth intermediate signal, and rear half is obtained as the real part of the product of j exp((2^m)7cj(2k+1)/(2N)) and the sum of k-th sample of third intermediate signal and k-th sample of fourth intermediate signal (col. 22 lines 61-63).

Re claim 5, Tsutsui discloses a signal processing device adapted to perform a linear inverse transform on a signal band-limited to N/2^(m+l) samples out of N/2 samples and multiply the signal obtained by the linear inverse transform by an inverse transform window to produce N/2^(m+l) independent signals (col. 5 lines 21-44), device comprising; a preprocessing means (col. 5 lines 34-37) for performing a predetermined preprocessing operation on the band-limited signal; a transform processing means (col. 5 lines 37-41) for performing a processing operation equivalent to a fast Fourier transform on the output signal of preprocessing means; a postprocessing means (col. 5 lines 41-45) for performing a predetermined postprocessing operation on the output signal of transform processing means; and the input signal and the output signals of transform processing means being complex signals having a length of N/(2^(m+2)) (col. 5 lines 37-41). Tsutsui fails to disclose a case wherein m is an integer larger than 1. However, Suter et al. disclose in Figure 1 that the data are down sampling prior entering FFT stages (col. 3 lines 28-40). In addition, "m" integer is just a factor to control the rate of down sampling prior entering the FFT stages as m is larger, the sampling rate would be longer

and lesser sampling values. Tsutsui discloses the input sample is N however N would be any number represent samples. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to have $N/(2^m)$ samples wherein m is larger than 1 as seen in Suter et al.'s reference into Tsutsui's invention because it would enable to performing faster Fourier transforming employing mathematically justified manipulation of input data rate and lower power consumption by processor (abstract).

Re claim 6, Tsutsui further discloses preprocessing means produce the following signal from band-limited N/(2^(m+ 1)) samples; first intermediate signal (col. 24 lines 21-31) of which k-th sample is obtained by setting the 2k-th band-limited sample for k between 0 and N/(2^(m+2))-1, and inverting the polarity of the N/(2^m)-1-2k-th band-limited sample for k between N/(2^(m+2)) and N/(2^(m+1))-1 (k being an integer from 0 to N/2-1); and complex signal for output equivalent to the signal of which k-th sample is a product of exp (-2^(m+2)pi*jn/N) and a complex signal of which real part is 2k-th sample of first intermediate signal and imaginary part is 2k+1-th sample of first intermediate signal (col. 24 lines 31-49).

Re claim 7, Tsutsui further discloses postprocessing means produce the following signal from the N/(2^(m+2)) sample output complex signal of transform processing means; second intermediate signal (col. 24 lines 56-68) of which n-th sample is obtained by halving the sum of n-th and the conjugate of N/(2^(m+2)-1-n-th sample of output complex signal of transform processing means (n being an integer from 0 to N); third intermediate signal (col. 25 lines 1-2), of which n-th sample is obtained by dividing 2j

and multiplying exp(-2^(m+1)pi*j(2n+1)/N) by the value subtracted conjugate of N/(2^(m+l))-1-n-th from n-th sample of output complex signal of transform processing means; fourth intermediate signal (col. 25 lines 3-12), of which n-th sample is obtained by halving the sum of the N/(2^(m+2))-1-n-th and the conjugate of the n-th sample of output complex signal of transform processing means; fifth intermediate signal (col. 25 lines 13-17), of which n-th sample is obtained by dividing 2j and multiplying exp(-2^(m+l)pi*j(2n-t-1)/N) by the value subtracted conjugate of n-th from N/(2^(m+2))-1-n-th sample of output complex signal of transform processing means; sixth intermediate signal (col. 25 lines 18-25), equivalent to the signal of which front half is obtained as the real part of the product of exp(-(2^(m+l))pi*j(2n+l)/(2N)) and the sum of the n-th sample of second intermediate signal and n-th sample of third intermediate signal, and rear half is obtained as the real part of the product of -j exp((2^m)pi*j(2n+1)/(2N)) and the sum of the n-th sample of fourth intermediate signal and n-th sample of fifth intermediate signal; and, signal for output (col. 16 lines 46-47 and col. 18 lines 7-12), equivalent to the signal of which n-th sample is obtained by the n+N/(2^(m+2))-th sample of sixth intermediate signal for n between 0 and N/(2^(m+2))-1, inverting the polarity of the 3N/ (2^(m+2))-1n-th sample of sixth intermediate signal for n between N/(2^(in+2)) and 3N/(2^(m+2))-1, and inverting the: polarity of the n-3N/(2^(m+2))-th sample of sixth intermediate signal for n between 3N/(2^(m+2)) and N/(2^m)-l.

Re claim 8, Tsutsui further discloses in Figure 1 transform window has a length corresponding to N/(2^m) samples obtained by halving the suin of the (2^(m)n+(2.^(m-1))-l-th sample and the (2^(m)n+(2^(m-1))-th sample for the length corresponding to the

N samples without being subjected to any band-limit (wherein the J-1-th block overlaps the J-th block of 50%).

Re claim 17, it is a method claim of claim 1. Thus, claim 17 is also rejected under the same rationale in the rejection of rejected claim 1.

Re claim 18, it is a method claim of claim 2. Thus, claim 18 is also rejected under the same rationale in the rejection of rejected claim 2.

Re claim 19, it is a method claim of claim 3. Thus, claim 19 is also rejected under the same rationale in the rejection of rejected claim 3.

Re claim 20, it is a method claim of claim 4. Thus, claim 20 is also rejected under the same rationale in the rejection of rejected claim 4.

Re claim 21, it is a method claim of claim 5. Thus, claim 21 is also rejected under the same rationale in the rejection of rejected claim 5.

Re claim 22, it is a method claim of claim 6. Thus, claim 22 is also rejected under the same rationale in the rejection of rejected claim 6.

Re claim 23, it is a method claim of claim 7. Thus, claim 23 is also rejected under the same rationale in the rejection of rejected claim 7.

Re claim 24, it is a method claim of claim 8. Thus, claim 24 is also rejected under the same rationale in the rejection of rejected claim 8.

Response to Arguments

5. Applicant's arguments with respect to claims 1-8 and 17-24 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (703) 305-5655. The examiner can normally be reached on M => F from 7:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (703) 305-9662. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C. Do
Examiner
Art Unit 2124

August 17, 2004

TODD INGBERG
PRIMARY EXAMINER